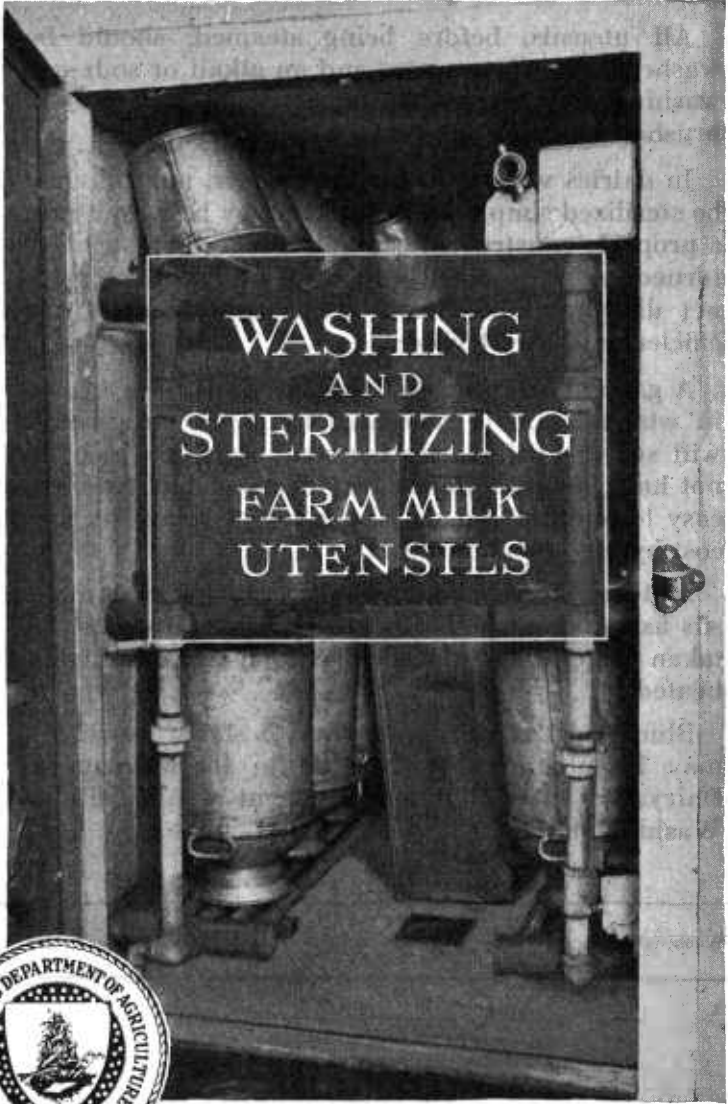


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U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1473



WASHING AND STERILIZING FARM MILK UTENSILS



ALL UTENSIL SURFACES with which milk comes in contact should be sterilized before being used. The word "sterilized," as used in this bulletin, means to destroy practically all bacteria, including those which may cause disease.

All utensils, before being steamed, should be washed with warm water and an alkali or soda-ash washing powder and rinsed in clean, pure water; brushes, not rags, should be used.

In dairies which have steam boilers, utensils may be sterilized simply and effectively by being put into a properly constructed cabinet, after which steam is turned in. Perforated coils on the floor of the cabinet distribute the steam evenly and increase the efficiency of the sterilizer.

A galvanized-iron box sterilizer and water heater in which steam is generated by a fire underneath will serve satisfactorily for some dairies which do not have steam boilers. Sterilizers of this type are easy to operate and may be made at relatively low cost by any good tinsmith.

A steam jet may be used for sterilizing such utensils as cans and pails; but in using it care must be taken to steam the utensils until they are thoroughly heated.

Blue prints of different types of steam sterilizers may be procured by writing to the Bureau of Dairying, United States Department of Agriculture, Washington, D. C.

Washington, D. C.

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WASHING AND STERILIZING FARM MILK UTENSILS

By R. J. POISSON, *Assistant Market Milk Specialist, Bureau of Dairying*

ONE OF THE GREATEST sources of sour milk and low-grade dairy products is the unsterilized utensil. The tiny bacteria that cause souring, off flavors, and sometimes sickness, grow very fast on the moist surfaces of unsterilized pails, strainers, cans, etc. Although utensils may have been well washed and appear clean to the eye, they are not really clean unless they have been sterilized. Even in grandmother's day the clean dairy, with its spotless, shining milk utensils which had been thoroughly scalded, was noted for its good butter. And to-day the dairies with clean, sterilized utensils usually lead in low bacteria counts and in products for which there is a special demand.

The quantity and kind of equipment required for washing and sterilizing dairy utensils naturally vary with the size of the dairy. Small dairies many times need only simple equipment; in the larger dairies the utensils usually are washed and sterilized most economically by the use of more elaborate equipment.

THE WATER SUPPLY

For washing and rinsing utensils a clean, safe water supply is absolutely necessary. Contaminated water may be a source of danger not only to those on the farm but to all those who use milk from the farm. Wells and springs should always be protected from surface drainage. The drainage from privies, hog pens, barnyards, and other sources of contamination should always be away from the well, and both springs and wells should be walled in, curbed, and tightly covered.

HOW TO WASH UTENSILS

Milk utensils should always be thoroughly washed and rinsed before being placed in the sterilizer. If this is not done, sterilization is not only made more difficult but milk which may be adhering to the utensils is "cooked on." This makes them harder to clean the next time they are washed and furnishes food for the few bacteria which may remain after the sterilization process, enabling them to multiply and at least partially to defeat the purpose of sterilization.

The same principles apply to washing utensils in dairies of all sizes. Care should always be taken to remove with cold or lukewarm water as much as possible of the foreign material or milk or cream adhering to the surfaces of cans, pails, bottles, and other utensils before placing them in the hot wash water. Otherwise this water will soon become dirty, highly contaminated with bacteria, and unfit for use. By first rinsing the utensils washing is made easier and more effective, and less washing powder is required to clean them. All remaining foreign matter should then be removed by scrubbing with warm water and an alkali or soda-ash washing powder, after which the utensils, before being sterilized, should be rinsed in water which is known to be clean and pure. The wash water should be about as warm as the hands will bear, and it is well to have the rinse

water at least slightly warm. The amount of washing powder which is necessary to use in the wash water will vary with the hardness of the water. Enough should be used to "break" the water, so that grease may be removed from utensils. Soap or greasy powder should not be used for washing milk utensils.

EQUIPMENT FOR WASHING UTENSILS

The equipment required for washing utensils in farm dairies of varying sizes where the washing is done by hand is similar in type and simple in construction. In dairies where there are few utensils to wash, smaller wash sinks of perhaps lighter construction than in the larger dairies may be used, and less expensive equipment for heating water will be needed, but in general their needs are much the same.

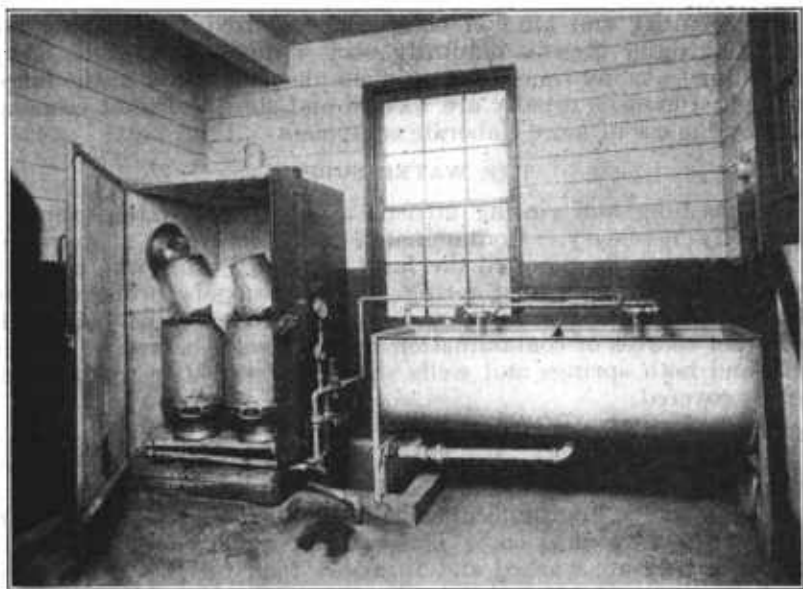


FIG. 1.—A wooden sterilizing cabinet lined with galvanized iron; and a galvanized-iron wash sink, divided into two compartments for washing and rinsing utensils

A galvanized-iron round-bottom sink or vat is a decided help in washing utensils. Such a sink may be purchased at a reasonable cost from dairy supply houses. It should have two compartments, for use in washing and rinsing. By connecting it with a drain and piping running water to it, labor is saved and the work of washing utensils is made much easier. (Fig. 1.)

In the smaller dairies hand brushes aid materially in cleaning the utensils; in the larger ones mechanical brushes may be used to advantage. Hand brushes of varying shapes and sizes for different purposes not only save time but help in thoroughly cleaning the utensils. Rags should not be used, because they are difficult to clean and sterilize and also have a tendency to smear grease and other foreign matter instead of loosening it as a brush does.

A separate room, preferably adjoining the one in which the milk is handled, should be provided for washing utensils. If there are only two rooms in the milk house it is preferable to wash the utensils in the room in which the boiler or stove is situated rather than in the room where the milk is handled. The floor of the wash room should be water-tight and should slope toward a drain.

STERILIZATION BY STEAM

Utensils in dairies which have steam boilers may be sterilized effectively and simply by being put into a cabinet which is free from cracks, after which steam is turned in. If the boiler is of sufficient capacity, the inside temperature of the sterilizing cabinet and of the utensils which it contains may be raised in a few minutes approximately to that of boiling water. If the steam is evenly distributed in the cabinet, and it is ascertained from a reliable thermometer placed in the top of it that a temperature of 200° F. or over has been maintained for five minutes or more, it is certain that practical sterilization of the utensils has been obtained. A slightly longer time gives a margin of safety.

Utensils such as cans, pails, and bottles should always be placed in the sterilizing cabinet in an inverted position. If they are allowed to stand right side up, air pockets may prevent the steam from coming in contact with their entire inner surfaces—at least it will take longer to heat them. Furthermore, an upright position does not allow the condensed steam to drain from them. Large sterilizing cabinets may be equipped with slatted shelves or racks upon which the utensils may be placed. This saves space and aids the circulation of the steam. Bottles may be sterilized in their cases; but, if it is desirable to save space, they may be satisfactorily handled on removable shelves or racks containing openings to receive the necks.

Since steam has a tendency to rise, it should be liberated underneath the utensils and, if possible, at the bottom of the sterilizing cabinet. It should also enter the cabinet from several openings in order to assure even distribution. One way which has proved satisfactory is to admit the steam through a perforated pipe coil, which may be laid on the floor of the sterilizer. Another way is to construct shelves of piping connected with the boiler and of which the center pipe in each shelf is perforated every foot or so. The utensils are inverted on these shelves. Coils similar to the ones shown in Figure 2 may be placed on the floor of the sterilizer. It will be noted in this instance that the steam passes through a long closed coil before it reaches the perforated coil. This closed coil may be used as a radiator to furnish heat for drying the utensils after the valve which admits steam to the perforated coil has been closed.

CONSTRUCTION OF STERILIZING CABINETS

Satisfactory sterilizing cabinets may be constructed of various materials. Reinforced concrete and hollow tile, wood, galvanized iron, brick, or stone may be used—in fact, any material which is not easily damaged by steam and of which a tight box can be constructed. In the case of wood it is better to use two thicknesses of boards put on at different angles to prevent warping. A wooden cabinet built of one thickness of boards, with a water-tight lining of

galvanized iron, makes a very satisfactory sterilizer. Care should be taken in constructing a sterilizing cabinet that the door fits tightly and that there are no cracks through which steam may escape.

It is advisable to equip the cabinet with a safety valve set to open before any appreciable pressure is sustained. The ordinary sterilizer will stand very little steam pressure. The advantage of an increase

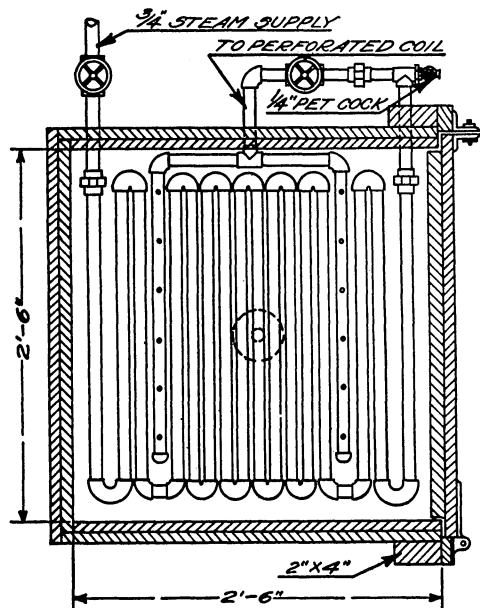


FIG. 2.—Perforated and closed coils which may be used on the floor of the sterilizing cabinet to distribute the steam and dry the utensils after they are steamed. If it is not desired to dry the utensils, the closed coils may be omitted. To dry the utensils, the valve leading to the perforated coil is shut, and the one between the closed coil and the boiler is opened wide

in the temperature at even 2 or 3 pounds gauge pressure is more than offset by the danger of springing a leak and thereby impairing the usefulness of the sterilizer. Practical sterilization may be obtained without applying pressure.

There should be a drain in the floor of the cabinet to carry off condensed moisture. Such a drain should be water-sealed, which may be done by installing a trap in the drain pipe lower than the outlet of this pipe. The lower section of the pipe will remain full of water, which prevents the escape of steam through the drain. If drying coils are to be used after the utensils are steamed, there should be a damper near the bottom of the sterilizer and one in the top. The upper one should open into a galvanized pipe which is extended to carry the vapor

outside the building. In constructing a cabinet a small hole in which a thermometer may be fitted should always be provided. The most protected place for this is usually in the top of the sterilizer.

OPERATION OF STERILIZING CABINETS

The operation of a sterilizing cabinet is a simple matter. The time required to obtain a sterilizing temperature in the cabinet will depend upon several factors, including the size and construction of the sterilizer, the capacity of the boiler, the pressure of steam developed, and the temperature of the surrounding air. After the temperature of the cabinet has been above 200° F. for 5 minutes, the valve leading to the perforated coil may be closed. It may be found in practice that the temperature of the sterilizer will remain high for several minutes after the steam is turned off, but this time will vary in different cases.

If glass bottles are being sterilized, steam should be turned in slowly at first; and after sterilization is completed the cabinet should not be opened until its temperature has fallen considerably.

If this rule is not observed, the bottles are liable to be broken, especially if the surrounding air is cold.

Unless they are dried in the sterilizer or are to be used within a few hours after sterilization, utensils should be removed from the cabinet as soon as they are cool enough to handle and inverted on a rack in a protected place to drain and dry. Drying the utensils after sterilization prolongs their life by preventing rust and retards later bacterial growth. If they are to be used for milk 24 hours or more after sterilization, it is important that they be thoroughly dried soon after they are steamed.

Drying coils in the sterilizer will be found to be a distinct advantage in procuring dry utensils. In case these coils are used, before the drying process is started and after the utensils have been steamed the dampers in the bottom of the door and the top of the cabinet should be opened to allow and aid the escape of the moisture which is evaporated from the utensils.

THE GALVANIZED-IRON BOX STERILIZER

In small dairies where the milk is bottled and in some wholesale dairies which do not have steam boilers utensils may be sterilized efficiently and economically in a galvanized-iron box sterilizer. This sterilizer is simple in construction and easy and economical to operate. It may be made by almost any tinsmith at a reasonable cost. It consists merely of a box with a tightly fitting lid, under which heat is applied. It may be set on a concrete, brick, or stone foundation which serves as a fire box, or on a gas or oil stove, or some other heating device. One-half to three-quarters of an inch of water is used in the box.

The utensils are placed in this sterilizer on a slatted rack 1 or 2 inches off the bottom to hold them out of the water. The lid is then put on and enough heat applied underneath the box to boil the water. This generates steam, which soon raises the temperature in the box approximately to that of the boiling water. The sterilization process is exactly the same as for any other steam-sterilizing cabinet, except that the steam is generated within the box.

The bacteria contained in 10-gallon cans after they were washed and rinsed were practically all killed in the sterilizer shown in Figure 3. Bacterial counts showed that each of these cans contained on the average at least 80,000,000 bacteria before sterilization, as compared with 2,100 after sterilization.

This box sterilizer may also be used as a water heater and is a handy means for procuring hot water for washing utensils. If the process is made continuous, the utensils may be placed in the box and sterilized by burning only a comparatively small quantity of fuel after most of the water has been drawn off.

Blue prints of this box sterilizer and instructions for operating it, and also blue prints of sterilizing cabinets for use with steam boilers, are mailed free upon request by the Bureau of Dairying, United States Department of Agriculture, Washington, D. C.

STERILIZATION OF LARGE EQUIPMENT

Utensils and equipment, such as coolers and bottle fillers, which it may not be practicable to put into the cabinet, may be sterilized

by covering tightly and turning in steam or boiling water. If running water is available, it may be heated with steam by means of a mixing tee and run over the cooler, or into the bottler and other equipment, at about boiling temperature. Efficient sterilization may be accomplished in this manner. This method is to be preferred to that of attempting sterilization by shooting steam at the equipment through a hose. The boiling water comes in direct contact with the surface of the utensils, kills bacteria, and also rinses the utensils. On the other hand, steam, which is usually applied through a hose, has lost much of its heat by the time it reaches the bacteria and so serves only as a meager rinse. When water is used, care should be taken that it is boiling hot, and

that enough is used to heat the utensils thoroughly. A satisfactory way to sterilize bottlers is to fill them full of boiling water and allow them to stand five or more minutes. Milking-machine rubbers and teat cups also may be easily sterilized with hot water, although slightly different treatment is required than for other utensils. Directions for cleaning milking machines are given in Farmers' Bulletin 1315, which is sent free upon request.

STERILIZATION WITH A STEAM JET

Utensils such as cans and pails may be sterilized by inverting them over a steam jet, although this system is not to be recommended for general farm use. The effectiveness of the jet will depend upon the steam-gauge pressure used, the size of the opening through which the steam is ejected, and the length of time the utensils

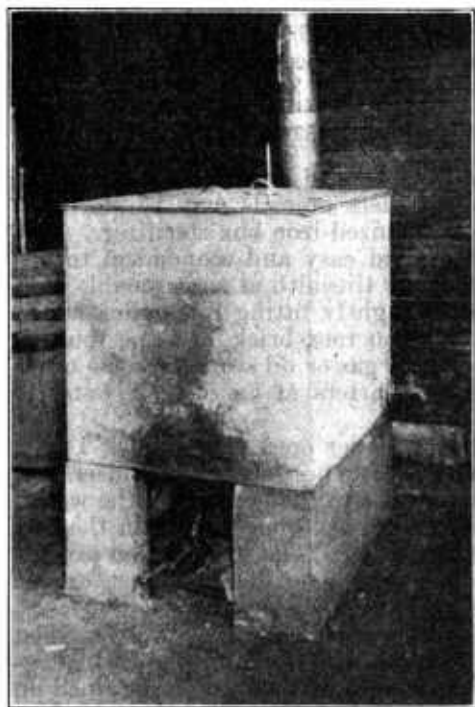


FIG. 3.—Galvanized-iron box steam sterilizer and water heater suitable for small retail and medium-sized wholesale dealers. In the operation of this sterilizer a steam boiler is not required

are steamed. It usually requires about a half minute to steam a 10-gallon can thoroughly if the steam-gauge pressure is 20 to 25 pounds. If a steam jet is used, the utensils should be steamed until they are too hot to handle with the bare hands. After treatment in this manner they will become dry from their own heat if placed right side up and uncovered for a few minutes before they are inverted on the rack.

Steam jets may easily be made by extending a pipe from the boiler a half inch or an inch through the drain board of the sink and providing a valve directly under it by which the steam may be turned on and off.